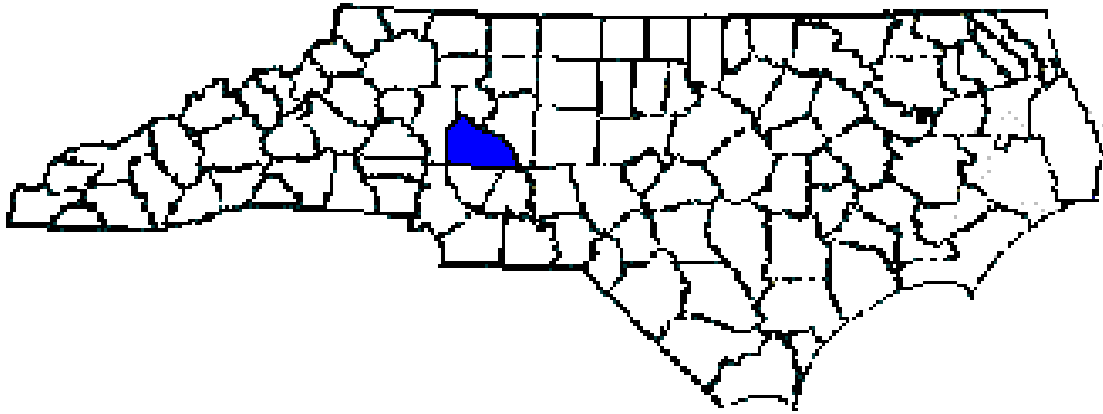
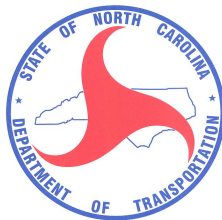


ANNUAL REPORT FOR 2009



Setman Branch Mitigation Site
Rowan County
TIP No. R-2911E



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North Carolina Department of Transportation
October 2009

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- Appendix A – Cross Section and Longitudinal Profile Comparisons
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SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the Year 2009 at the Setman Branch Mitigation Site in Rowan County. This site was constructed during 2006 by the North Carolina Department of Transportation (NCDOT). This report provides the monitoring results for the second formal year of monitoring (Year 2009). The Year 2009 monitoring period was the second of three scheduled years for monitoring on Setman Branch Mitigation Site (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring along Setman Branch, it has met the required monitoring protocols for the second formal year of monitoring. The channel is stable at this time. The streambank and buffer area is vegetated for the second year of monitoring. The North Carolina Department of Transportation will continue stream monitoring at the Setman Branch Mitigation Site for 2011.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2009 at the Setman Branch Mitigation Site. The site is located on US 70 just west of Salisbury (Figure 1). The Setman Branch Site was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2911E in Rowan County.

The mitigation project covers approximately 180.4 linear feet of channel length. Construction was completed during March 2006 by the North Carolina Department of Transportation (NCDOT). Stream restoration involved restoring sinuosity to the stream, sloping the adjacent streambanks to promote stability, installation of root wads, and widening the floodplain to allow for major flood events. It also included the installation of coir fiber matting and planting of bareroot seedlings along the streambank and in the buffer area.

1.2 Purpose

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2009 at the Setman Branch Mitigation Site. Hydrologic monitoring was not required for the site.

1.3 Project History

March 2006	Construction Completed
September 2007	Stream Channel Monitoring (1 yr.)
January 2008	Replanted Mowed Buffer Plantings
January 2009	Installed Fence Around Buffer Plantings
February 2009	Replanted Mowed Buffer Plantings
October 2009	Stream Channel Monitoring (2 yr.)



Figure 1. Vicinity Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

The following surveys were conducted in support of the monitoring assessment:

Stream Geomorphological Assessment

- ◆ The stream shall be monitored for a duration of 5 years from end of construction (channel modifications and vegetation planted)
- ◆ The data shall be collected and submitted to the NCDWQ and the US Army Corp of Engineers in the 1st, 3rd, and 5th years after construction
- ◆ The stream dimension shall be measured using a permanent cross-section (surveyed or GPS) established in a riffle section
- ◆ The stream profile shall be ascertained by measurement of stream slope including the average pool and riffle slope as well as the overall stream slope, and the pool to pool spacing

Stream Vegetative Assessment

- ◆ NCDOT shall provide evidence of vegetative success through annual photographs.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The mitigation of Setman Branch involved restoring sinuosity to the stream, sloping the adjacent streambanks to promote stability, installation of root wads, and widening the floodplain to allow for major flood events. It also included the installation of coir fiber matting and planting of bareroot seedlings along the streambank and in the buffer area.

2.2.2 Monitoring Conditions

The objective of the Setman Branch stream restoration was to build an E5 stream as identified in the Rosgen's Applied River Morphology. A total of one cross section (one in a riffle) was surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1. Data shown in Table 1 includes one cross section chosen to represent a riffle section.

Table 1. Abbreviated Morphological Summary (Setman Branch Site)

Variable					
	Proposed	2007	2009	2011	
		Cross-Section #1	Cross-Section #1		
Drainage Area (mi ²)	0.7	0.7	0.7		
Bankfull Width (ft)	23.33	7.5	10.51		
Bankfull Mean Depth (ft)	2.66	0.69	0.79		
Width/Depth Ratio	8.78	10.87	13.3		
Bankfull Cross Sectional Area (ft ²)	61.9	5.19	8.32		
Maximum Bankfull Depth (ft)	4.27	1.15	1.9		
Width of Floodprone Area (ft)	112	19.16	19.7		
Entrenchment Ratio	4.78	2.55	1.88		
Slope	0.01	0.004	0.005		

*Drainage Area, Floodprone Width, and Slope are averaged values only.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of one cross section and the longitudinal profile of Setman Branch established by the NCDOT after construction. The length of the profile along Setman Branch was approximately 200 linear feet. The cross section was established during the 2007 monitoring year. The cross section location was subsequently based on the stationing of the longitudinal profile and is presented below. The location of the cross section and longitudinal profile is shown in Appendix A.

- ◆ Cross-Section #1. Setman Branch, Station 179+00, midpoint of riffle

Based on comparisons of the Year 2007 to the Year 2009 cross section data, the riffle cross section appears stable with little or no active bank erosion. A graph of the cross section is presented in Appendix A. Future survey data will vary depending on actual location of rod placement and alignment, however, this information should remain similar in appearance.

The longitudinal profile showed that the length of the channel is stable and functioning properly. A beaver dam located downstream of cross section #1 and outside of the profiled channel was removed. NCDOT will continue to monitor the channel for stability and beaver activity.

2.4 Results of Stream and Buffer Vegetation

2.4.1 Description of Species

The following tree species were planted on the streambank:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the buffer area:

Quercus phellos, Willow Oak

Nyssa sylvatica, Blackgum

Liriodendron tulipifera, Tulip Poplar

Quercus nigra, Water Oak

Taxodium distichum, Baldcypress

Betula nigra, Baldcypress

2.4.2 Results of Vegetation Monitoring

Streambank Vegetation: The stream is vegetated throughout the channel and in the buffer area with black willow, silky dogwood, black gum, willow oak, water oak, river birch, baldcypress, and tulip poplar.

Site Notes: Other vegetation noted: lespedeza, goldenrod, tearthumb, briars, sweetgum, pine, multiflora rose, foxtail, tag alder, *Juncus* sp., and various grasses. The buffer area on the right side of stream was continually being mowed so NCDOT installed control access fence around the site in January 2009. NCDOT replanted the buffer on the right side of the stream in February 2009.

3.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS

The Setman Branch Site has met the required monitoring protocols for the second formal year of monitoring. The channel is stable at this time. The streambank and buffer area is vegetated for the second year of monitoring. NCDOT will continue monitoring in 2011.

4.0 REFERENCES

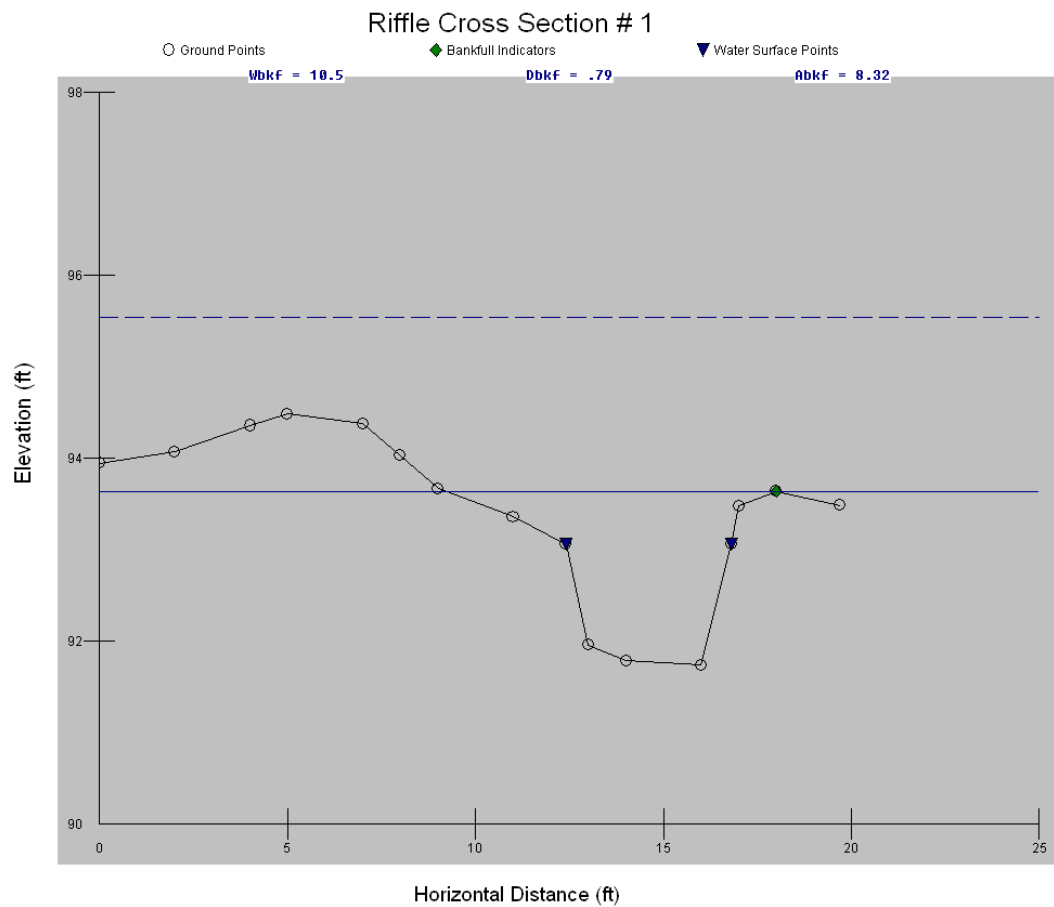
North Carolina Department of Transportation (NCDOT), December 10, 2003.
Permit for US 70 from west of SR 1953 to US 601 in Salisbury (R-2911E).

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines.
Prepared with cooperation from the US Environmental Protection Agency,
NC Wildlife Resources Commission, and the NC Division of Water Quality.

APPENDIX A

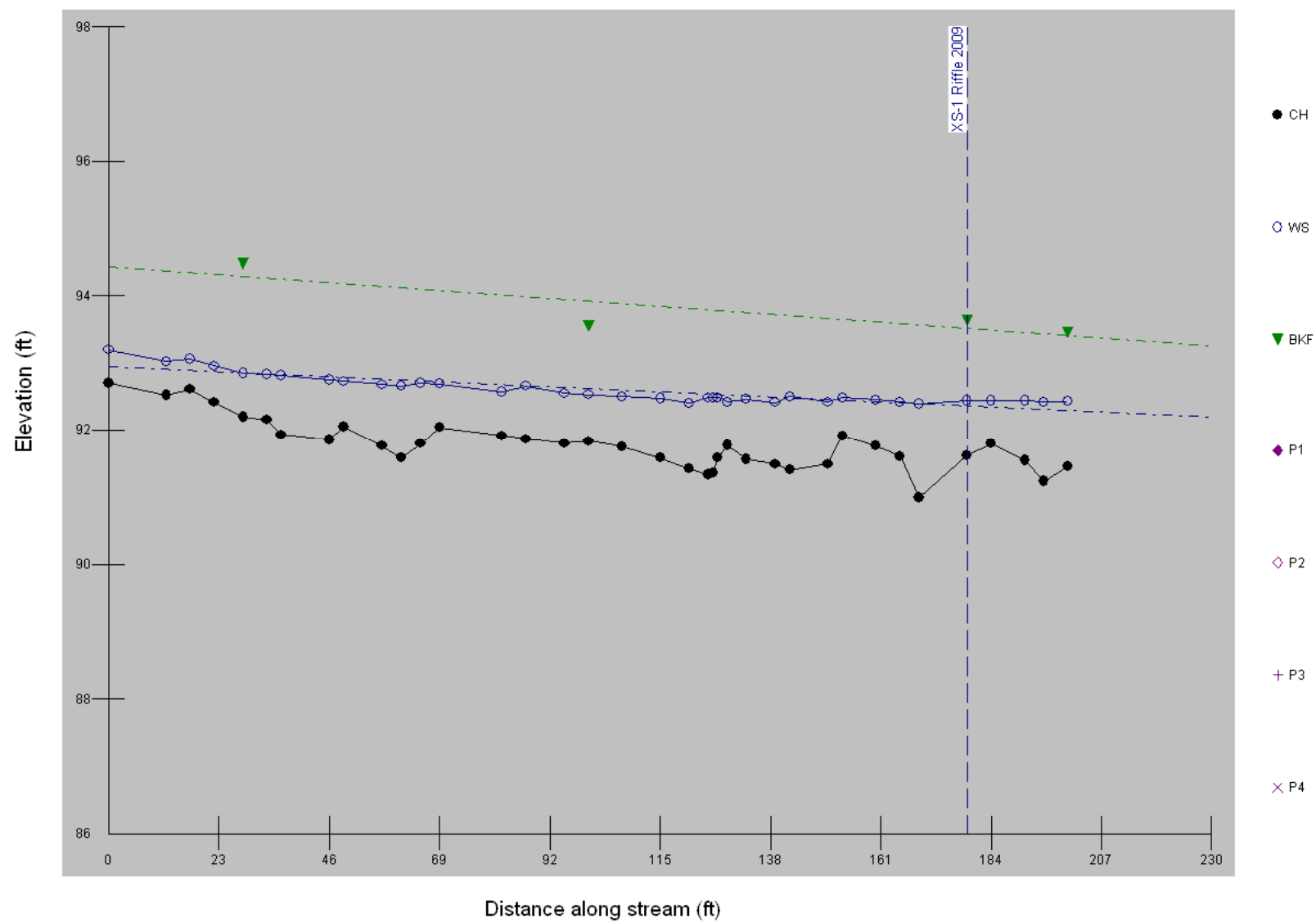
CROSS SECTION AND LONGITUDINAL PROFILE COMPARISON



Cross-Section #1 (Riffle) Abbreviated Morphological Summary

	2007	2009	2011
Bankfull Cross Sectional Area (ft²)	5.19	8.32	
Maximum Bankfull Depth (ft)	1.15	1.9	
Width of the Floodprone Area (ft)	19.16	19.7	
Bankfull Mean Depth (ft)	0.69	0.79	
Width/Depth Ratio	10.87	13.3	
Entrenchment Ratio	2.55	1.88	
Bankfull Width (ft)	7.5	10.51	

Setman Branch



APPENDIX B

SITE PHOTOGRAPHS AND SITE MAP

Setman Branch



PP #1 Looking downstream from top of culvert



PP #2 Upstream



PP #2 Downstream



PP #3 Upstream



Removed beaver dam located downstream of XS #1
October 2009

Setman Branch
R-2911E
Rowan County

